Comparing the effectiveness of SureForm vs laparoscopic staplers in bariatric robotic procedures

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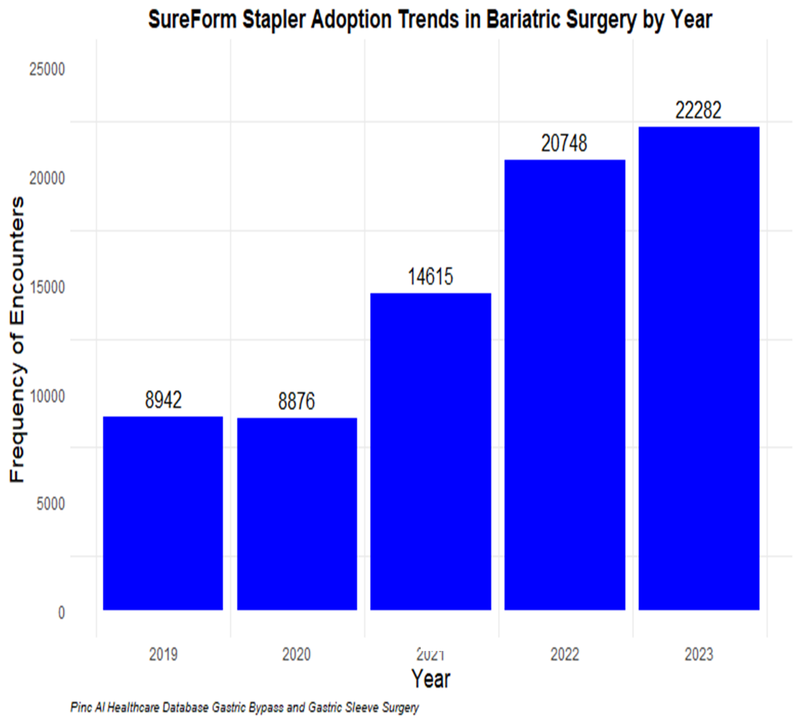
SIGNIFICANCE & AIM: It is difficult to quantify the impact of surgical instruments and accessories (I&A) on hospital and patient outcomes when using claims data. We aim to identify I&A in real-world data using natural language processing (NLP) to provide insights on robotic versus laparoscopic products and their impact on clinical outcomes.

OBJECTIVE: Evaluate the effectiveness of robotic SureForm staplers (RS) compared with laparoscopic bedside stapling (BS) in bariatric robotic procedures.



METHODS: The PINC AI™ Healthcare Database was used to extract patients who underwent robotic sleeve gastrectomy or gastric bypass procedures between 2019 and 2023. We employed an NLP model and pattern matching searches to identify cases where each stapler type was used. Then, we trained a convoluted neural network (CNN) model to identify encounters where staplers were used. Patient demographics, hospital characteristics, billing information, and operative details were also captured. Standardized mean differences were used to assess covariate balance before and after applying propensity score matching (PSM) to compare outcomes between RS and BS cases. Regression adjustments were used to control for any remaining imbalance.

CNN Model Accuracy

Category	Precision	Recall	F1-score	Support
BS	0.96	0.95	0.96	462
RS	0.99	0.97	0.98	187
Other	0.99	0.99	0.99	7433
Accuracy			0.99	8082
Macro	0.97	0.97	0.98	8082
Weighted	0.99	0.99	0.99	8082

RESULTS: A total of 37,684 complete encounters were identified, of which 30,737 (81.5%) were RS and 6,947 (18.5%) were BS cases. 6,373 encounters were included in the analysis. Patient outcomes differed between RS and BS, with RS cases having significantly lower LOS (RR = 0.91, 95% CI = 0.88 to 0.94), fewer ICU visits (OR= 0.51, 95% CI = 0.33 to 0.79), and lengthier OR times (exp(Coeff)= 1.06, 95% CI = 1.05 to 1.08) in the adjusted model.

Outcome	PSM adjusted RS vs BS	Regression adjusted RS vs BS
Length of stay (LOS)	Favors RS	Favors RS
30-day readmission	No difference	No difference
30-day reoperation	No difference	No difference
ICU visit, index and 30-day	Favors RS	Favors RS
Bleeding	Favors RS	No Difference
Leak	No difference	No difference
Blood transfusion	No difference	No difference
Organ SSI	No difference	No difference
OR Time	Favors BS	Favors BS

Statistically significant p-value favoring RS
Statistically significant p-value favoring BS

CONCLUSIONS: When considering stapler type used in bariatric robotic procedures, there are notable differences between cases where robotic SureForm stapler is used versus BS, with RS cases having significantly reduced LOS, fewer ICU visits, and longer OR times.